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ACCURACY OF SIX-DAY AND FIVE-DAY-A-WEEK TRAP NESTING FOR
ESTIMATING THE ANNUAL EGG PRODUCTION

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During the 1941 International Baby Chick Association convention in Kansas City, Missouri, a special committee of the U. S. Record of Performance Federation met for the purpose of considering the practicability of using short-interval trap-nesting for candidate pullets entered under U.S.R.O.P. supervision. The membership of this committee is as follows:

Hobart Creighton, President, U. S. Record of Performance Federation,
Warsaw, Ind.

Dr. George Ghostley, First Vice President, U. S. Record of Performance
Federation, Anoka, Minn.

Herman C. Deanne, President, Poultry and Egg National Board, Sewell, N. J.

Arthur J. Hannah, Secretary-Treasurer, U. S. Record of Performance Federation,
Grand Rapids, Mich.

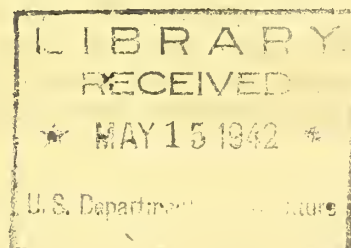
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At this committee meeting a paper was reviewed, entitled "Accuracy of Short-Interval Trap Nesting of the Fowl", by Prof. E. E. Schnetzler^{1/} of Purdue University, La Fayette, Ind. The members present concluded that Professor Schnetzler's paper contributes some very valuable possibilities that would decrease materially the labor cost in U.S.R.O.P. breeding work. They were especially interested in eliminating Sunday trap-nesting. They requested, however, that further study should be made of other flocks with a larger number of birds.

Professor Schnetzler's paper involved the records of 380 White Leghorn pullets and 83 White Leghorn hens. He concluded that, from a genetic viewpoint, a selection program, or progeny test, based on trap-nesting 4, 5, or 6 days each week should be for all practical purposes, as satisfactory as one based on daily trap-nesting.

The present study is based on first-year trap-nest records of 400 Rhode Island Red and 428 White Leghorn individually pedigreed pullets. The Rhode Island Reds were the daughters of 9 sires and 56 dams and the White Leghorns were the daughters of 10 sires and 61 dams. Only the dams with 5 or more daughters were included in the study. The total number of eggs laid on 6 and 5 consecutive days each week were determined for each daughter. The estimated egg production was then obtained for each of the two methods by multiplying the two values obtained by seven-sixths and seven-fifths, respectively. The two resulting estimated records were then compared with the actual record obtained for the complete 365-day period.

1/ Poultry Science 20:551-555 (1941)



The comparison of the estimated record with the actual record is summarized by sires for both breeds in table 1. It will be noted that, according to the actual records, 205 of the 400 Rhode Island Red daughters laid 200 or more eggs. The number of birds laying 200 or more eggs according to the estimated records for 6- and 5-day trap nesting was 207 and 206, respectively, or a difference of 2 birds for 6-day records and 1 bird for 5-day records. However, as will be noted in tables 3 and 4, 5 nonqualifying individuals qualified and 3 qualifying individuals failed to qualify on the basis of 6-day trap nesting and 4 nonqualifying individuals qualified and 3 qualifying individuals failed to qualify on the basis of 5-day trap nesting. It will also be noted that 230 of the 428 White Leghorns qualified according to the actual records, but 231 and 229 respectively, qualified on the basis of the 6-day and 5-day records. Again referring to Tables 3 and 4, it will be noted that 7 birds qualified and 6 failed to qualify on the basis of 6-day records and 8 qualified and 9 failed to qualify on the basis of 5-day records. All these discrepancies concern birds with actual records close to 200 eggs.

The average egg production on the basis of daily, 6-day, and 5-day-a-week trap nesting is 198.0, 197.9, and 197.8, respectively, for the Rhode Island Reds and 200.2, 200.9, and 200.9, respectively, for the White Leghorns. The average difference between the actual and the estimated records as given in the two right hand columns of the table show very low values for each sire. It could be concluded from this table that the estimates from either 6- or 5-day records are practically as accurate as the actual record in evaluating sires on the basis of their daughters' egg production records.

To illustrate the accuracy of evaluating the dams on the basis of their daughters' estimated records, the family record for the dams mated with the first White Leghorn sires listed in table 1 is summarized in table 2. Of the 18 dams mated with these 3 sires, the number of daughters qualifying for production according to the 2 estimated methods are the same except in the case of 2 dams. Dam 3289 mated with sire 50 had 1 more daughter to qualify on the basis of 6-day records and 1 less on the basis of 5-day records. One daughter whose actual record was 199 eggs had estimated records of 203 and 199 eggs, respectively, on the basis of the 6- and 5-day records. Another daughter with an actual record of 200 eggs had estimated records of 201 and 199 eggs, respectively, on the basis of 6- and 5-day records. The other exceptional case was dam 4541 mated to sire 91. One daughter from this mating with an actual record of 197 eggs had estimated records of 198 and 200 eggs, respectively, on the basis of 6- and 5-day records.

It will also be noted in table 2 that the daughter's average egg production is high for the first male, low for the second male, and intermediate for the third male. If a poultry breeder were selecting sons and daughters to be used in future U.S.R.O.P. matings on the basis of their family records, it is apparent that his selection would be about the same whether he used either of these two methods.

Of the 36 daughters of sire 3 qualifying for production, 27 laid more than 225 eggs, 15 laid more than 250, and 5 laid more than 275. Therefore, the majority of these daughters would likely be used. He would also select 1 or more sons probably from dam 3693 and dam 3769 and for this purpose the estimated

averages would be just as adequate as the actual record. Only 5 of the 13 daughters of sire 50 laid more than 225 eggs and 1 laid more than 250. A breeder would question the advisability of using any of these qualifying daughters and he certainly would not use a son in a U.S.R.O.P. mating. Just how much consideration a breeder would give to sire 91 would also depend upon how many breeding males and females he needed for his breeding program since, according to table 1, 4 other males of that breed appear to have better family records. Ten of the 25 qualified daughters laid more than 225 eggs, but only 3 laid more than 250. A breeder would be interested in using some of the 7 qualifying daughters of dam 3299 and possibly a son, since 7 out of 7 qualified. At least he would use the dam again with some other male.

It should be understood of course that the breeder's selection would depend upon the information regarding numerous other factors in his breeding program such as egg weight, body weight, range livability, rate of growth, rate of feathering, breed type, etc.

In order to show the variation of the average difference between the actual production and the production based on 6- and 5-day records for all the dams including the 18 listed in table 2, frequency distributions were constructed as shown in table 5. As has been previously stated, each of these families had 5 or more daughters. Although the majority of the average differences are very close to zero, they vary on the basis of 6-day records from minus 4.0 to plus 2.0 and minus 3.0 to plus 5.0, respectively, for Rhode Island Reds and White Leghorns. On the basis of 5-day records they vary from minus 5.0 to plus 5.0 and from minus 6.0 to plus 6.0, respectively, for the Rhode Island Reds and White Leghorns. Again it is to be questioned whether the variation shown in this table would affect the breeder's judgment to any appreciable degree. In the 3 extreme cases of White Leghorn families where the records were from 5 to 6 eggs off for the estimations from the 5-day record, it was found that the same number qualified in each case as for the actual record; i.e., 5 out of 5, 5 out of 5, and 3 out of 7. The average production for the 2 families in which all the daughters qualified was 220.6 and 244.4 eggs. The other family with only 3 out of 7 birds qualifying had an average production of 188.3 eggs. It is apparent then that the extreme cases would affect very little a breeder's judgment in selecting breeding birds on a family basis.

It can be concluded that the estimated records from either the 6- or 5-day-a-week trap-nesting are accurate enough for all practical purposes for selecting breeding birds on the basis of family records. On the other hand, in numerous instances a poultry breeder has only the individual record of a female or, in the case of a male, his dam's individual record. In such cases and also in selected individuals from families that have about the same average as all of the flock, an inaccurate estimation of the individual records may be of some significant value. Any extreme discrepancy of individual records has a special significance in the minds of the purchaser of breeding stock.

Table 6 gives frequency distributions of the difference between the actual records and those estimated from 6- and 5-day records for all the individual daughters used in this study. It will be noted from a study of this table that in the case of the estimated records for 6-day trap-nesting 7.7 percent of the Rhode Island Reds and 12.9 percent of the White Leghorns varied more than 5 eggs

from the actual record, but only 0.3 percent of the Rhode Island Reds and 0.5 percent of the White Leghorns varied more than 10 eggs. The estimated records from the 5-day trap-nesting show that 24.8 percent of the Rhode Island Reds and 27.3 percent of the White Leghorns varied more than 5 eggs from their actual record, but only 4.5 percent of the Rhode Island Reds and 2.8 percent of the White Leghorns varied more than 10 eggs from the actual records. Since the table gives the cumulative percentage variation for each egg variation from the mean, one can readily estimate what percentage of the flock is likely to vary a significant amount from the actual record by the 2 different methods.

Table 1. A comparison of 6-day and 5-day-a-week calculated egg-production records with the actual records for the daughters of each sire.

Breed	Sire No.	No. daughters trap-nested	Number daughters qualifying for egg production on basis of:			Average egg production				
			7-day record	6-day record	5-day record	7-day record	6-day record	5-day record	Difference	
									6- and 7-day record	5- and 7-day record
R. I. R.	173	46	30	34	33	215.8	216.8	217.7	+1.0	+1.9
"	200	46	21	20	20	194.7	194.1	195.0	-0.6	+0.3
"	330	69	35	35	35	196.5	196.3	196.5	-0.2	0.0
"	334	22	11	10	10	204.6	204.6	202.7	0.0	-1.9
"	358	49	22	22	21	187.8	187.2	186.0	-0.6	-1.8
"	351	58	14	15	15	170.3	170.3	170.5	0.0	+0.2
"	352	31	15	15	15	197.5	197.4	197.0	-0.1	-0.5
"	368	49	32	31	32	207.0	206.5	206.0	-0.5	-1.0
"	10105	30	25	25	25	229.9	230.6	230.9	+0.7	+1.0
Total or ave.		400	205	207	206	198.0	197.9	197.8	-0.1	-0.2
W. L.	3	44	36	36	36	232.6	233.3	233.8	+0.7	+1.2
"	50	46	13	14	12	173.2	172.9	173.2	-0.3	0.0
"	91	42	25	25	26	202.4	203.0	202.9	+0.6	+0.5
"	100	44	27	30	27	214.5	215.3	215.4	+0.8	+0.9
"	249	53	32	31	31	207.6	209.6	209.1	+2.0	+1.5
"	250	25	21	21	21	230.4	231.8	232.5	+1.4	+2.1
"	252	34	23	22	22	199.4	199.9	200.2	+0.5	+0.8
"	254	37	16	15	17	196.6	197.3	197.0	+0.7	+0.4
"	259	60	23	23	22	188.6	187.8	188.2	+0.8	-0.4
"	10106	43	14	14	15	182.7	183.4	183.9	+0.7	+1.2
Total or ave.		428	230	231	229	200.2	200.9	200.9	+0.7	+0.7

Table 2. A comparison of 6-day and 5-day-a-week calculated egg-production records with the actual records for the daughters of the first three White Leghorn sires listed in table 1, by dams.

Sire No.	Dam No.	No. daughters trap-nested	Number daughters qualifying for egg production on basis of:			Average egg production				
			7-day record	6-day record	5-day record	7-day record	6-day record	5-day record	Difference	
									6-day and 7-day record	5-day and 7-day record
3	3428	9	6	6	6	233.8	233.6	233.6	-0.2	-0.2
	3693	12	10	10	10	235.1	236.9	237.3	+1.8	+2.2
	3767	6	5	5	5	219.2	219.5	221.0	+0.3	+1.8
	3769	5	5	5	5	255.0	256.8	256.8	+1.3	+1.8
	3824	7	6	6	6	231.6	232.2	232.0	+0.6	+0.4
	4145	5	4	4	4	220.0	219.8	221.6	-0.2	+1.6
Total or average		44	36	36	36	232.6	233.3	233.8	+0.7	+1.2
50	2786	5	0	0	0	158.8	159.0	158.0	+0.2	-0.8
	3289	11	3	4	2	180.0	181.2	180.0	+1.2	0.0
	3466	8	5	5	5	199.1	198.5	199.7	-0.6	+0.6
	3695	11	5	5	5	194.0	193.5	194.2	-0.5	+0.2
	4512	11	0	0	0	133.1	131.4	129.9	-1.7	-0.2
Total or average		46	13	14	12	173.2	172.9	173.2	-0.3	0.0
91	3299	7	7	7	7	225.6	225.0	225.3	-0.6	-0.3
	3562	5	2	2	2	196.6	196.8	200.0	+0.2	+3.4
	3640	8	5	5	5	213.8	214.8	213.2	+1.0	-0.6
	3728	5	4	4	4	213.4	214.2	215.0	+0.8	+1.6
	3845	5	2	2	2	174.8	177.2	177.8	+2.4	+3.0
	4541	7	3	3	4	196.9	197.8	196.5	+0.9	-0.4
	4545	5	2	2	2	182.0	181.8	180.4	-0.2	-1.6
Total or average		42	25	25	26	202.4	203.0	202.9	+0.6	+0.5

Table 3. Egg production of daughters qualifying on basis of 6- and 5-day records that failed to qualify on basis of 7-day records.

Breed	Seven-Day record	Six-day record	Five-day record
Rhode Island Red	199	205	206
"	198	201	203
"	198	200	196
"	197	203	209
"	198	201	199
"	196	198	202
White Leghorn	197	200	202
"	199	201	204
"	196	202	197
"	199	203	199
"	197	198	203
"	197	198	200
"	196	201	207
"	198	200	195
"	199	203	209
"	196	198	200
"	194	198	200

Table 4. Egg production of daughters qualifying on basis of 7-day records that failed to qualify on basis of 6- and 5-day records.

Breed	Seven-day record	Six-day record	Five-day record
Rhode Island Red	210	198	197
"	203	196	200
"	203	202	197
"	202	195	198
White Leghorn	200	205	197
"	201	200	196
"	200	201	199
"	204	198	200
"	200	196	197
"	205	197	196
"	205	197	199
"	202	198	199
"	200	197	192
"	205	202	197

Table 5. The frequency distributions of the calculated average egg production for the daughters of each dam showing the deviations from the averages for the actual records.

Average variation in number of eggs	Six-day records				Five-day records				
	Rhode Island reds		White Leghorns		Rhode Island Reds		White Leghorns		
	No. fam- ilies	Per- cent	Cumu- lative per- cent	No. fam- ilies	Per- cent	Cumu- lative per- cent	No. fam- ilies	Per- cent	Cumu- lative per- cent
-5.1 to -5.0							1	1.6	1.6
-4.1 to -5.0	1	1.8	1.8	1	1.6	1.6	0	0.0	1.6
-3.1 to -4.0	7	5.4	7.2	4	6.6	8.2	2	3.3	4.9
-2.1 to -3.0	11	19.6	26.8	33	54.1	34.1	0	0.0	4.9
-1.1 to -2.0	32	57.1	57.1	12	19.7	37.7	28	45.9	11.5
-1.0 to +1.0	9	16.1	16.1	7	11.5	18.0	13	21.3	42.6
+1.1 to +2.0				3	4.9	6.5	6	9.8	21.3
+2.1 to +3.0				1	1.6	1.6	4	6.6	21.3
+3.1 to +4.0							1	1.6	11.5
+4.1 to +5.0							2	3.3	4.9
+5.1 to +6.0									3.3
Total	56	100.0		61	100.0		56	100.1	